

AMENDMENTS TO THE CLAIMS

Claim 1. (Currently Amended) A combustion engine apparatus,  
comprising:

a first stage piston engine,

fuel consisting of a first portion and a second portion,

means for combusting said first portion of said fuel in said a first stage  
piston engine in a first stage producing fuel rich piston engine exhaust gases  
with said piston engine exhaust gases containing said second portion of said fuel;

a second stage turbine engine operatively connected to said first stage  
piston engine,

means for combusting said second portion of said fuel contained in said  
fuel rich piston engine exhaust gases in said second stage turbine engine at  
stoichiometric conditions producing turbine engine exhaust gases; and

means for supercharging said first stage piston engine using said turbine  
engine exhaust gases, said means for supercharging said first stage piston engine  
comprising means for directing said turbine exhaust gases from said second  
stage turbine engine into said first stage piston engine.

Claim 2. (Original) The combustion engine apparatus of claim 1 wherein  
said piston engine is a diesel engine.

Claim 3. (Original) The combustion engine apparatus of claim 1 wherein  
said piston engine is a compression ignition engine, a homogenous charged  
compression ignition engine, a variable compression engine, a nitrogen enriched  
air combustion engine, a rotating engine, a linear engine, and/or a reciprocating  
engine.

Claim 4. (Original) The combustion engine apparatus of claim 1 wherein  
said means for combusting said fuel contained in said piston engine exhaust

gases in said second stage turbine engine includes compressor means for providing compressed air to said second stage turbine engine for combusting said fuel contained in said piston engine exhaust gases.

Claim 5. (Original) The combustion engine apparatus of claim 1 wherein said fuel is oil, methane, natural gas, ammonia, alcohols and/or ethers.

Claim 6. (Original) The combustion engine apparatus of claim 1 wherein said fuel is any combustible matter including fossil fuels inorganic fuels and/or organic fuels.

Claim 7. (Original) The combustion engine apparatus of claim 1 wherein said fuel is any combustible matter including oil, natural gas, coal, and/or inorganic fuels including ammonia, hydrazine, calcium, and/or organic fuels including alcohols, ethers, wood.

Claim 8. (Currently Amended) A combustion engine apparatus, comprising:

fuel, said fuel made up of a first portion and a second portion,  
a first stage piston engine for combusting said first portion of said fuel in a first stage, said first stage piston engine producing piston engine exhaust gases with said piston engine exhaust gases containing said second portion of said fuel;  
a second stage turbine engine for combusting said second portion of said fuel contained in said piston engine exhaust gases in a second stage at stoichiometric conditions, said second stage turbine engine producing turbine engine exhaust gases;  
a supercharger for supercharging said piston engine using said turbine engine exhaust gases, and  
means for directing said turbine exhaust gases from said second stage turbine engine into said supercharger.

Claim 9. (Original) The combustion engine apparatus of claim 8 wherein said first stage piston engine is a compression ignition engine, a homogenous charged compression ignition engine, a variable compression engine, a nitrogen enriched air combustion engine, a rotating engine, a linear engine, and/or a reciprocating engine.

Claim 10. (Original) The combustion engine apparatus of claim 8 including a compressor for providing compressed air to said second stage turbine engine for combusting said fuel contained in said piston engine exhaust gases.

Claim 11. (Original) The combustion engine apparatus of claim 8 wherein said fuel is oil, methane, natural gas, ammonia, alcohols and/or ethers.

Claim 12. (Original) The combustion engine apparatus of claim 8 wherein said fuel is any combustible matter.

Claim 13. (Original) The combustion engine apparatus of claim 12 wherein said any combustible matter comprises fossil fuels including oil, natural gas, and/or coal.

Claim 14. (Original) The combustion engine apparatus of claim 12 wherein said any combustible matter comprises inorganic fuels including ammonia, hydrazine, and/or calcium.

Claim 15. (Original) The combustion engine apparatus of claim 8 wherein said any combustible matter comprises organic fuels including alcohols, ethers, and/or wood.

Claim 16. (Currently Amended) A combustion engine method that provides increased fuel efficiency and reduces polluting exhaust emissions by burning fuel in two stages, said fuel consisting of a first portion and a second portion, comprising the steps of:

combusting said first portion of said fuel in a piston engine in a first stage, said step of combusting said first portion of said fuel in a piston engine in a first stage producing piston engine exhaust gases, said piston engine exhaust gases containing said second portion of said fuel;

combusting said second portion of said fuel contained in said piston engine exhaust gases in a second stage turbine engine at stoichiometric conditions, said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine at stoichiometric conditions producing turbine engine exhaust gases; and

using said turbine engine exhaust gases to supercharge said piston engine by directing said turbine engine exhaust gases into said piston engine.

Claim 17. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a compression ignition engine.

Claim 18. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a homogenous charged compression ignition engine.

Claim 19. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a variable compression engine.

Claim 20. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a nitrogen enriched air combustion engine.

Claim 21. (Original) The combustion engine method of claim 16 including the step of operating said piston engine fuel rich thereby producing a reducing atmosphere and suppressing the formation of NO<sub>x</sub>.

Claim 22. (Original) The combustion engine method of claim 16 including the steps of burning most of said fuel in said the piston engine and maintaining said piston engine exhaust gases sufficiently fuel rich for a second burn in said turbine engine.

Claim 23. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a compression ignition engine that has heterogeneous combustion resulting in said fuel in said piston engine exhaust gases being at stoichiometric conditions.

Claim 24. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine occurs at or near stoichiometric conditions at reduced combustion temperatures where NO<sub>x</sub> is difficult to form.

Claim 25. (Original) The combustion engine method of claim 16 wherein said step of using said turbine engine exhaust gases to supercharge said piston engine comprises using said turbine engine exhaust gases to drive a compressor that supercharges said piston engine.

Claim 26. (Original) The combustion engine method of claim 16 including using said compressor to provides compressed air to said turbine engine for said the step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine.

Claim 27. (Original) The combustion engine method of claim 16 wherein said piston engine is a compression ignition engine and wherein the residence time of combusting said fuel contained in said piston engine exhaust gases in said turbine engine is increased to ensure that all hydrocarbons and particles are burned.

Claim 28. (Original) The combustion engine method of claim 16 wherein said piston engine is a compression ignition engine and wherein excess air is added in said turbine engine is increased to ensure that all hydrocarbons and particles are burned.

Claim 29. (Original) The combustion engine method of claim 16 wherein said piston engine is a spark ignition engine that is operated fuel rich to suppress engine knock.

Claim 30. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage is combusted with an oxidizer stream.

Claim 31. (Original) The combustion engine method of claim 30 wherein said oxidizer stream is nitrogen enriched air.

Claim 32. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine stage is combusted with an oxidizer stream.

Claim 33. (Original) The combustion engine method of claim 32 wherein said oxidizer stream is air.

Claim 34. (Original) The combustion engine method of claim 32 wherein said oxidizer stream is nitrogen enriched air.

Claim 35. (Original) The combustion engine method of claim 16 wherein said step of combusting said fuel in a piston engine in a first stage and/or said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine stage is combusted with an oxidizer stream.

Claim 36. (Original) The combustion engine method of claim 16 wherein said fuel is oil, methane, natural gas, ammonia, alcohols and/or ethers.

Claim 37. (Original) The combustion engine method of claim 16 wherein said fuel is any combustible matter including fossil fuels (oil, natural gas, coal,

etc.) inorganic fuels (ammonia, hydrazine, calcium, etc.) and/or organic fuels (alcohols, ethers, wood, etc.).

Claim 38. (Original) The combustion engine method of claim 16 wherein said steps of combusting takes place to perform work.

Claim 39. (Original) The combustion engine method of claim 16 wherein said steps of combusting takes place to provide heat.

Claim 40. (Original) The combustion engine method of claim 39 wherein said heat is used for a furnace.

Claim 41. (Original) The combustion engine method of claim 39 wherein said heat is used for a boiler.

Claim 42. (Original) The combustion engine method of claim 39 wherein said heat is used for a smelter.

Claim 43. (Original) The combustion engine method of claim 39 wherein said heat is used for an Otto engine.

Claim 44. (Original) The combustion method of claim 16 including the step of providing a bypass valve placed in front of said piston engine to assist starting and acceleration of said piston engine.

Claim 45. (Original) The combustion method of claim 16 including the step of providing direct fuel injection into said turbine engine to assist starting and acceleration of said piston engine.

Claim 46. (Original) The combustion method of claim 16 including the step of providing a starter to said turbine engine to start said turbine engine and said piston engine.

Claim 47. (Original) The combustion method of claim 16 including the step of providing a mixing device between said piston engine exhaust and said turbine engine entrance to make a well-stirred fuel and oxidizer stream into said turbine engine.